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Annual Contributions (or compositions in lieu thereof), the Mathematical Society having announced its resolution to transfer its valuable Library, with its Records and Memorials, to the Royal Astronomical Society.

" 'I have the honour to be, Sir, your most obedient servant,

" 'Robert Main, Secretary.'

"It was then moved by Professor De Morgan, seconded by Mr. Galloway, and resolved unanimously :—

" 'That the recommendation of the Council in the circular now read be approved and adopted by this Meeting; and that on the Library, Records, and Memorials of the Mathematical Society being delivered over to this Society, the following sixteen gentlemen, Members of the Mathematical Society, be admitted Fellows of the Royal Astronomical Society without payment of the admission fees or annual contributions required by the Bye-laws—viz.:

William Wilson, Esq.
Robert Graham, Esq.
Robert Porrett, Esq.
James Scott Bowerbank, Esq.
Julius Page, Esq.
John Williams, Esq.
Henry De Berckem, Esq.
Alfred White, Esq.
Thomas K. White, Esq.
Philip James Chabot, Esq.
Charles O. Dayman, Esq.
Thomas Cooper, Esq.
John Walton, Esq.
Jacob Hoyer, Esq.
Robert Arthur Graham, Esq.
Thomas Taylor, Esq.

and that the remaining three members of the Mathematical Society—viz.:

Benjamin Gompertz, Esq.
John James Downes, Esq.
John Lee, Esq.

or such of them as are liable to the payment of Annual Contributions, be exempted in future from such liability.' "

At the meeting of 1845 November 14 "Mr. Stratford stated that the books received consisted of

76	volumes	folio
622	„	4to
1,442	„	8vo
311	„	12mo

131 books not bound or catalogued, and that six volumes were yet to be delivered; that the Council had this day determined to complete the deficient sets of the most valuable works, to re-arrange the library, and to prepare a new catalogue, uniting the books of the two societies as early as possible."

Professor Dr. Friedrich Wilhelm Gustav Spörer was the son of a merchant of Berlin, in which city he was born on

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1822 October 23. He was educated at the Friedrich Wilhelm Gymnasium and at the University of Berlin. Here he studied under Steiner, Ohm, Minding, Poggendorf, Mitscherlich, and other professors, but those who exercised the greatest influence upon him were Encke and Dove. He took his degree in Mathematics and Astronomy in 1843, and obtained his doctorate for a thesis entitled "De Cometa qui anno 1723 apparuit." In 1844 he served as a computer under Encke at the Berlin Observatory, and he computed the perturbations of Encke's comet for the period 1838 to 1845; later he derived the elements of the comet from the apparitions of 1819–1838, and computed its ephemeris for a part of the year 1845. This first contribution to astronomy appeared in the *Astronomische Nachrichten*, and was incorporated in a paper on that comet by Encke himself. From 1846 until 1874 he adopted the profession of teaching. He first went to the Gymnasium at Bromberg, as instructor in mathematics and natural science; in 1847 to Prenzlau; and in 1849 to the Grammar School at Anclam, where he occupied a post for twenty-five years and was eventually elected pro-rector. But though engaged in other occupations he did not lose his strong early love for astronomy, and by the year 1860 it led him to devote his leisure hours to that systematic study of Sun-spots which has made his reputation as an astronomer. Though at first provided with but a small and indifferent telescope, furnished only with a ring micrometer, he quickly brought out his first results; the earliest of the long series of solar observations which he communicated to the *Astronomische Nachrichten* appearing in No. 1315, with date 1861 June 13, and bearing the title "Beobachtungen von Sonnenflecken und daraus abgeleitete Elemente der Rotation der Sonne." In this paper he gives the rotation period of the Sun as deduced from the observation of a number of spots, which appeared to him to be of a stable character. Having found the inclination of the Sun's equator to the ecliptic to be approximately $7° 30'$, and the longitude of the ascending note to be $78°$, he computed the heliographic coordinates for a considerable number of single spots, and from each series the angle of rotation of the Sun (ξ) and its time of rotation (T) were deduced. The means of these values were $\xi = 14°{\cdot}2965$ and $T = 25^{d}\ 4^{h}\ 21^{m}$. This paper and the similar communications which followed it brought him under the notice of many men of distinction and influence, amongst others of Professor Schellbach, the tutor to the Crown Prince Frederick William (afterwards the Emperor Frederick). In recognition of the good work that he had done the Crown Prince gave him in 1868 a good 5-inch glass equatorially mounted and driven by clockwork. In the same year he went to the East Indies with Professor Tietjen and Dr. Engelmann to observe the total solar eclipse at Mulwar, in the Bombay Presidency, in longitude $5^{h}\ 3^{m}\ 21^{s}$ east, and north latitude $16°\ 34'{\cdot}7$, but clouds prevented the observation of totality. This was the only interruption of a considerable length of time

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that his Anclam observations experienced. Six years later he accepted an official position in the Astrophysical Observatory at Potsdam, and was promoted to the rank of "Chief Observer" in 1882. His researches during these latter years (1871–1893) are contained in the Publications of the Astrophysical Observatory, and his concluding observations appeared in the first half of the tenth volume, issued very shortly before he died. Professor Vogel's farewell to his chief observer and colleague in the Introduction came, therefore, pathetically soon before his death. The director says that with the "first part of this publication Professor Spörer closes the long list of his works on Sun-spots. The results of his labours given in the Publications of the Astrophysical Observatory embrace a period of over twenty-two years, from 1871 October 1 to 1893 December 31, and constitute an eloquent testimonial to the untiring industry and the great sense of duty of the renowned observer, who leaves the ranks of my colleagues on 1894 October 1, and enters into a well-earned rest." That rest he did not long enjoy, for he passed away at Giessen, on 1895 July 7, while on a visit to his children, without having sustained any weakening of his mental or physical powers or any previous indication of the disease which caused his death—paralysis of the heart. Professor Spörer left three sons and four daughters. One daughter was married to Professor Müller, Observer at the Observatory of Potsdam, and author of several astronomical works.

His colleague, Dr. O. Lohse, sums up his character in the following terms :—

"Spörer was a genuine Berliner of equable and cheerful temper ; he bore all the vicissitudes of life with undisturbed equanimity, and always at once reverted to his daily routine, *i.e.* to his study of the Sun, now so beloved by him. His constancy in this occupation as well as his conscientious discharge of his official duties was worthy of all admiration."

Amongst the recognitions which his long-continued labours received from foreign nations may be mentioned his election as Corresponding Associate of the Società degli Spettroscopisti Italiani on 1889 February 10, and the award to him on 1885 December 14 of the Valz Prize of the Institute of France.

The chief results of Spörer's labours in the field which he made so thoroughly his own were the redetermination of the mean rotation period of the Sun, resulting in a slightly different value from that found by Carrington—25·445 days as against 25·38 for latitude 15°—the confirmation of Carrington's observation of the decrease of the angular velocity of Sun-spots, with their distance from the equator ; the determination of the amount of this drift, and its representation by a simple empirical formula—$\xi = 8^\circ{\cdot}548 + 5^\circ{\cdot}798 \cos(\text{lat.})$—the determination of the length of the Sun-spot cycle from observations extending over 38 years ; and the demonstration that the progress of the cycle not only involves

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a change in the numbers and areas of the spots, but also in the zones which they affect; so that at the beginning of a new cycle the spots are found chiefly in high latitudes, but as the cycle progresses ever in lower latitudes, until at length the equator is reached. A feature of this "law of zones," which he pointed out, is the associated fact that the actual Sun-spot cycles overlap, the new current having its beginning before the expiring one has run out to its close. Besides his own observation of Sun-spots, Professor Spörer was indefatigable in searching out early records, and in two papers entitled, "Ueber die Periodicität der Sonnenflecken seit dem Jahre 1618," and "Sur les Différences que présentent l'Hémisphère nord, et l'Hémisphère sud du Soleil," communicated respectively to the Royal Leopold-Caroline Academy and to the *Bulletin Astronomique*, he traced back his "law of zones" to the year 1619, and showed that although there is on the whole an even balance between the number of spots in the two hemispheres, yet in three periods of the Sun's history the southern spots have predominated. A third and most interesting fact brought out in these papers was that of the apparent suspension of both the law of the spot cycle and the "law of zones" for about 70 years at the end of the seventeenth century. Dr. Spörer's regular observations of Sun-spots from his rotation No. 1 in 1861 January to rotation 445 in 1894 January are published in six volumes. The first two, or the Anclam observations, were issued as the thirteenth volume and its appendix of the publications of the *Astronomische Gesellschaft* in 1874 and 1876. The remaining four are contained in the *Publications of the Astrophysical Observatory of Potsdam* as vol. i., No. 1; vol. ii., No. 5; vol. iv., No. 17; and vol. x., No. 32. These volumes are illustrated by charts showing, rotation by rotation, the arrangement of the spots in longitude and latitude, in a somewhat similar form to that adopted by Carrington.

Professor Spörer was elected an Associate of the Royal Astronomical Society on 1886 November 12.

FRIEDRICH TIETJEN was born on 1832 October 15 at Garnhold, a village of Westerstede parish, in the Duchy of Oldenburg. His father owned a small farm, and Friedrich, on the early death of his elder brother, remained the eldest of six children and heir to the property. He was educated at first in a volksschule, and here showed great inclination and aptitude for figures; but this fact had little interest for his father, who was chiefly concerned that his son should be a good farmer, and to that end required him, even before he left school at the age of fifteen, to work in farm and field like other boys. Mathematics had, however, a special attraction for him, and he taught himself from such books as he could borrow, though his studies could only be pursued at night after a hard day's work, and if not perhaps unknown to, at any rate much against the will of, his father. It was contrary to all traditions of the family that the eldest son should resign